Water and Sediment Control Basin – 638
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I. Reference Materials

The following is a list of reference materials to be used in water and sediment control basin design and construction.

a. Engineering Field Manual - Chapter 2 & 3
b. Supplement to Engineering Field Manual - Chapter 2 & 3
c. Section IV, Technical Guide, Practice Standards (638) Mater and Sediment Control Basin and (620) Underground Outlets
d. Hydrology Manual for North Dakota
e. County Soil Survey Report
f. North Dakota Construction and Material Specification for Conservation Practices
g. Form ND-ENG-13

II. Site Investigation

The following is a list of items to be checked in the field:

a. Determine purpose of water and sediment control structure and whether this is the most practical solution to the problem.
b. Determine if the water and sediment control basin will fit with the cooperator's resource management system.
c. All items should be discussed with landowner to assure his understanding and acceptance.
d. Determine engineering job class (Engineering Job Approval Authority).
e. Check for buried utilities.
f. Adequate and stable outlet.
g. Determine drainage area, average watershed slope, and weighted cover complex number.
h. Log soils and review county soil survey data.
i. Determine if there is adequate topsoil to cover the embankment and cut areas.
j. Determine if water and sediment control structures can be built in series. If possible, check to see if the spacing fits the landowner's equipment size.
k. Determine borrow area if needed so it will improve the site.

III. Design Surveys

Survey notes shall be kept in loose-leaf or bound field notebooks. The notes will be kept in a format similar to that shown in Technical Release 62, and Chapter 1, Engineering Field Manual. The surveyor will obtain the following minimum information:

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a. Centerline Profile - Take L shots a minimum of every 50', or less if needed, along the centerline of the proposed water and sediment control structure to define the profile.

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b. Cross Sections - To determine the volume of earth fill, the yardage can be figured from the centerline profile. If determined by the SCSR, cross sections will be taken on non-uniform slopes to determine yardage.

   In no case will the spacing between the cross sections be greater than 100 feet. More cross sections will be required for irregular slopes or as determined by the SCSR.

c. Topographic survey upstream of the basin shall extend a minimum of 2.0 feet above the design top elevation. The topographic survey can be provided by extending the cross sections upstream enough to adequately describe the pool area vs. using a transit survey.

   If determined by the SCSR, additional survey will be obtained in borrow locations, so the finished area will enhance the cooperators resource management system.

   Additional downstream survey will be required to the extent that an adequate outlet for the sediment and water control structure can be provided. This will require, as a minimum, a profile downstream from the structure for at least 500 feet to show if a stable grade exists.

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d. Length - The length can be figured from L profile or by measuring with a chain or tape. The end stations of the fill shall be determined to figure the start of the fill stations.

e. Provide at least one good bench mark that will not be destroyed during construction, to use during construction and checkout.

IV. Design

The design of a water and sediment control basin will be in accordance with Standard and Specification (638) - Water and Sediment Control Basin, and (620) Underground Outlet, Section IV, Technical Guide.

The steps in design are as follows:

a. Plot profile, cross sections, and/or topographic survey of water and sediment control structure.
b. Determine the runoff from the 10 yr. 24 hr. storm, after determining drainage area, average watershed slope and curve number (CN).
c. Determine the anticipated 10-year sediment accumulation.
d. Add the required 10 year sediment accumulation and 10 year storm runoff to determine required storage capacity.

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e. Determine storage above the original ground to see if there is adequate storage.

f. Size the outlet and inlet, if needed, according to Standard and Specification (620), Underground Outlet.

g. Determine earthwork quantities and seeding quantities, if needed.

V. Construction Plans and Specifications

The cooperator, contractor, and the cooperator's file will be provided a set of plans and specifications for the water and sediment control basin. The plan may be Form ND-ENG-13.

The plan will contain, as a minimum, the following:

a. Overall Plan View - Show L's and stations.

b. Profile - Show original L ground line and design top elevation.

c. Cross Section - Show design cross sections.

d. Outlet sizes and locations.

e. Construction Notes - Notes to clarify or furnish direction in construction.

f. Quantities - Estimates

g. Job Approval

h. Construction specifications are to be provided with each set of plans. The North Dakota Construction and Material Specification for Conservation Practices shall be used for each item of work and material, as applicable or available. Additional specifications may need to be written to provide full material and installation instructions. A cover sheet and list of specifications is to be provided with the plans.

VI. Layout

Layout surveys will be recorded in loose-leaf or bound survey books. Set necessary stakes for alignment and side slopes. Set grade stakes as needed for the outlet pipe. Survey notes will be kept in the format as shown in Chapter 1, Engineering Field Manual and/or Technical Release 62.

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VII. Compliance Checking - "As-Built" Plans

a. The key items to inspect on water and sediment control basins during construction are:

(1) Adequate moisture.

(2) Adequate compaction of the embankment and backfill around outlet pipe.

(3) Top width and side slopes of the embankment.

(4) Adequate side sloping of the outlet trench operation before compaction.

(5) Adequate protection of the conduit inlet and outlet.

(6) Underground outlet needs an animal guard.

(7) Adequate coverage of topsoil.

(8) Check proper seed mixtures, drills, rates, and techniques are followed, if needed.

b. Compliance checking - Record in field notes or on ND-ENG-13.

(1) Record a minimum of two (2) cross sections per water and sediment control basin, not to exceed 300 feet between cross sections.

(2) Record length of embankment and outlets by the use of a chain or tape.

(3) Check top elevations of the water and sediment control embankment every 100 feet, as a minimum. Also note any low spots.

(4) Check adequacy of topsoil coverage.

(5) Measure area seeded, if specified, and check proper mixtures and drill rates.

(6) Check adequacy of the underground outlets.

(7) Complete Form ND-ENG-13.

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c. "As-Built" Plans

"As-built" plans are a record of constructed facilities. Changes from design are to be superimposed in a different color on the official file copy of the plans. On the "as-builts" show:

(1) Significant design changes.

(2) Significant changes in outlet location or design.

(3) Final quantities.

(4) Identify "as-built" on the plans.

(5) Contractor's name, address, and date of completion.

(6) Statement of compliance on "as-built". State the construction is complete according to plans and specifications. Date and sign by individual making determination.